

Collaborative Cultural Resource Creation: the example of the Art Museum Image Consortium

Jennifer Trant, David Bearman, and Kelly Richmond,
Art Museum Image Consortium (AMICO), USA

<http://www.amico.org>

Abstract

The Art Museum Image Consortium (AMICO) made a library of digital multimedia documentation of more than 50,000 works of art available under subscription to educational institutions in 1999. In so doing, it forged a new model of how museums and the educational sector might together create and sustain multimedia digital libraries, respecting copyright and making rich content available at an acceptable cost. In this paper, we examine AMICO's experience to analyze the common challenges that must be faced by any digital library construction project. A digital cultural heritage resource will be built on the collections of numerous repositories - why would these institutions want to collaborate and how can they be persuaded to continue to work together? It will digitize only a fraction of the possible material within its scope (especially in its first few years) - how will collection development decisions be made? It will represent existing content in digital form - what standards will it impose? It will create a copyright protected product and typically use copyright protected material - how will it acquire and protect intellectual property? It will be created in order to be used - what delivery systems will be deployed to provide access and by whom/for whom will they be operated? Such a resource will cost a great deal, especially when considered over many years - how can funding be sustained, who will pay for it and how will the funds be used?

Introduction

Despite recent digital developments, most human creations are physical artifacts and the greater part of our knowledge is still recorded only in analog form. But as museums involved in web site creation and online information delivery know very well, we are at the beginning of an age of digital and virtual culture. Yet socio-economic and technical models for construction and delivery of collections of digital materials - digital libraries - are all still experimental. Today we see commercial, governmental and not-for-profit entities all trying to be significant players in the delivery of quality, persistent online information. The fundamental questions all such organizations must answer are the same. Launching AMICO, a not-for-profit consortium of repositories holding works of art, has revealed some basic issues that must be addressed in the design of any digital library initiative. The specific choices AMICO has made, and how they relate to the matrix of options facing any collection 'going digital' are best understood in the context of an analysis of the policy options.

The Art Museum Image Consortium was formed in September 1997 as an independent not-for-profit membership organization of institutions with collections of art. AMICO Members are collaborating

to enable educational use of museum multimedia documentation; specifically, they are creating a digital library, the AMICO Library™, from their collective resources. They have decided to collaborate to do something no single institution could do on its own, provide a comprehensive service to the educational community. The experience of AMICO as a consortium, of the individual institutions who are its members and users, and of the organizations who are its subscribers and distributors serves as a case study of the issues involved in building multimedia digital libraries. In constructing networked cultural heritage resources AMICO is creating new products and processes. These new activities require new methods and strategies. Together AMICO members are facing social, economic, legal and technical challenges, as they strive to bring their collections together into a coherent and useful educational resource. As well as integrating data, however, we've realized that we're integrating people, institutions, and systems.

AMICO was founded to encourage broad use of museum collections in digital form. Such collections need to be persistent and searchable. While most museums now have a web site, the function of these sites varies from institution to institution; with few

exceptions, they are not designed to be collection catalogs. Most museum sites change content regularly to attract visitors to new museum exhibits or programs. Even when museums have decided to keep a substantial core of collections information available, it is difficult for users with a research objective to search across these online resources, which understandably have a very institutional focus. Technically, most quality museum content that can be viewed on the web, isn't really on the web at all; it resides in databases that are linked to the web rather than in static html pages. As a consequence, standard search engines are most unlikely to reveal these richness. The value of a single source for quality museum content was demonstrated in the experimental Museum Educational Site Licensing Project (MESL) and the institutions which founded AMICO turned that lesson into a permanent program (Getty, 1998a&b).

AMICO also has roots in the need to efficiently administer educational licenses. Museums contain works that are under copyright, they hold copyrighted photographs of works in their collections, and they create intellectual property in publications, interpretive programs, sound, video, and databases. Museums also negotiate with (and often pay) artists and artists estates for rights to reproduce works still under copyright. In a stringent funding climate, museums are wise to want to protect their own assets. They must manage the rights they license to others to ensure that they are able to leverage their investment in the creation of images and information about their collections. But museum licensing can become a cost center rather than a profit center when serving the educational community. The specter of wanting to dramatically increase educational use of digital resources while having to grant rights (often without fees) on a work by work, use by use, teacher by teacher, course by course, basis was enough to spur museum administrators to examine methods of more efficiently administering licenses collectively. Efficient administration also benefits users, for they are not supporting multiple transaction costs.

Museums are not equipped to support digital library services: 24x7 help desks and huge digital content delivery infrastructures are incidental to the museum's mission. AMICO members felt that other institutions, which are in the business of dis-

tributing digital content to a variety of educational institutions, could best develop both the services and the necessary interfaces and tools for effective use of multimedia documentation of works of art.

AMICO Members also wanted to create a forum in which they could exchange information and learn from each other about the technologies and techniques employed in the digitization of collections documentation. Building links among the museum professional staff who were creating museum multimedia resources ensured that the solutions being developed were not reached in isolation, and encouraged a more standards-based and integrative approach to technology strategy. Sharing information also leveraged institutional areas of expertise. Reaching out collectively to the users of museum digital documentation was also appealing. As a consortium we could build links to user communities and learn from them and their use of our collections.

AMICO's Members faced challenges that all creators of multi-institutional information resources encounter. These can be characterized as:

- Building Community and Defining Roles: Why would we want to collaborate? Who does what?
- Selecting Content: What will we compile?
- Defining Documentation: How will it be described?
- Specifying Technology: How do we digitize and provide access to it? What delivery methods should we use?
- Administering Intellectual Property: Do we have the rights to do this? What rights can we offer?
- Understanding Use: Who wants it, and what do they want to do with it?
- Sustaining Economics: How can we (collectively) pay for it?

Each of these inter-related areas affects the design and implementation of a social, technological, legal, and economic system for providing access to networked cultural heritage.

Building Community and Defining Roles

There are many organizational and individual players involved in the social system that enables the creation, delivery and use of a digital library resource. In AMICO's case, member institutions create the

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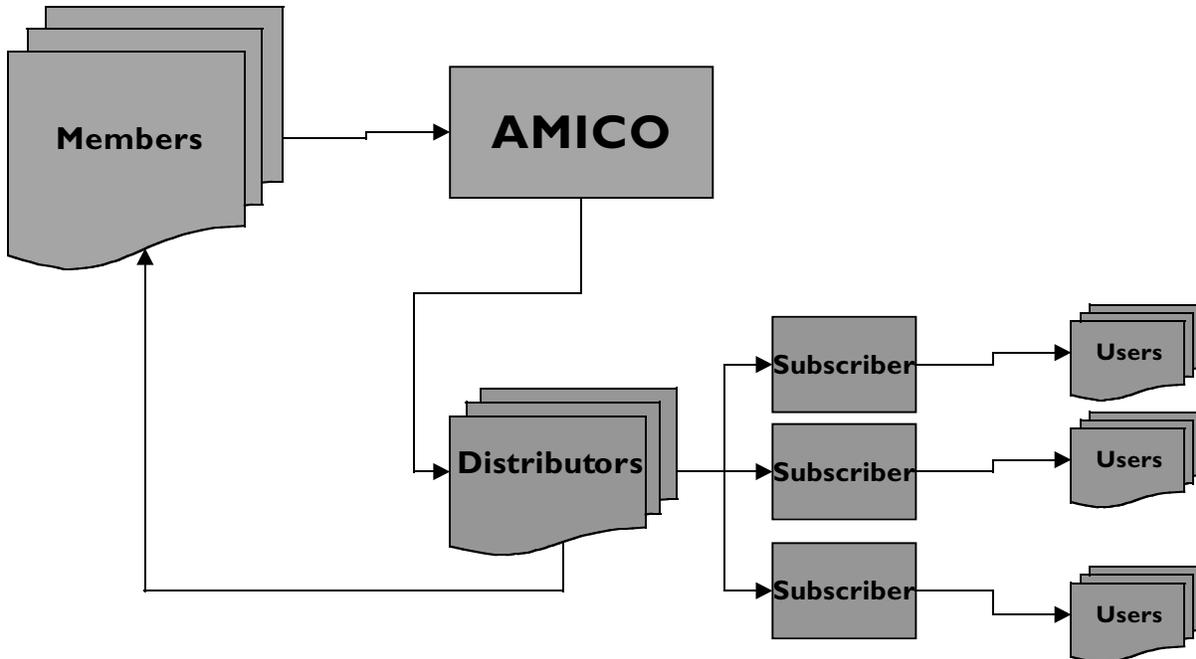


Figure 1: Creating and Delivering the AMICO Library

digital multimedia documentation without additional funding from AMICO or income tied to AMICO use. AMICO staff compile, validate and enhance the data, and pass the compiled Library on to distributors of networked information resources; they operate on income from members and subscribers. Distributors integrate the AMICO Library into their service provision networks, provide access to it, and support subscribers; their value added services need to be supported by their clientele. Subscribing institutions coordinate access for their users, and support their use, possibly by integrating sub-sets of the Library into local systems; this (new) resource competes with other resources for institutional funds. Individual users both search the entire Library online, and integrate selections into their own teaching and research environments. Each of the participants in this chain depends on the actions of the one before, to meet the needs of those who are in turn relying on them. Figure 1 diagrams these relationships.

Consortium Members

The Art Museum Image Consortium was founded by 22 institutions in the fall of 1997 after a six-month, self-funded planning exercise. Membership in the consortium is open and growing. There are

now over 30 members in North America. New members are welcome, and we are actively pursuing collaboration with European institutions. One measure of success of any such consortium is its continued ability sustain original membership and to attract new members.

Membership in AMICO has both benefits and responsibilities. Members support AMICO's activities through paying annual dues, scaled to their own budget, that range from \$2,500 - \$5,000. They contribute catalog records, images, texts, and multimedia files regularly to the Library (in annual increments). In return, AMICO Members gain access to the entire AMICO Library under a museum license (AMICO 1999b), for use in their educational programs, in galleries, their reference library, curatorial research, and other museum activities. They also profit from the technical expertise and assistance of the central staff of the Consortium and attend the AMICO annual meeting. They govern the organization and participate in its Working Committees – Editorial, Technical, Rights, and Users. This participation is itself a major benefit as it serves to develop staff expertise in an area in which all of the members can benefit from each other's experience. Maintaining a commitment of staff in member institutions through building professional and personal

relations is crucial to such enterprises. Membership activities are facilitated through a password-protected web site, and a series of topically focussed mailing lists.

Central Staff

In theory, compilations of distributed resources could be created through implementation of common standards, but in practice digital resources, even in mature areas such as union lists of library holdings (Coyle 2000) require central staff. The central staff of AMICO (now approximately 6 and growing to 8 FTE professionals) assists members in the digitization and documentation of their collections, and helps them make their contributions to the AMICO Library. In addition to compiling the resource, AMICO staff provides advice, training and support on an as-needed basis, and also develops specifications and best practices that serve the needs of all members.

The management of the legal agreements that provide the foundation for AMICO is also the responsibility of its staff. Any multi-institutional consortium is built on such legal agreements and needs to be open to their evolution over time. Each AMICO member signs both a Membership Agreement, providing AMICO with a license to use its digital documentation, and a Museum License, providing the Member with the right to use the full AMICO Library (AMICO, 1999a,b). AMICO also manages agreements with Distributors, who provide the Library to end users, and with Subscribers, who sign license agreements appropriate to their circumstances (AMICO, 1999b-e). AMICO staff has also negotiated a consortium-wide agreement with the Artists Rights Society (ARS) to facilitate the clearance of rights associated with modern and contemporary works that remain under copyright. AMICO administers this agreement and the associated royalty payments on behalf of its members which relieves them of what otherwise would be a significant administrative burden and extra costs.

AMICO compiles each Member's contribution into the AMICO Library, verifying data formats and vocabulary to ensure consistency. To do this, central staff built a series of software tools (a Contribution Management System) which include functionality such as online editing, term lists, biographical

files and term occurrence reports, that help the museums to more consistently edit their own data. AMICO staff also enhance indexing and construct and apply authority files to add terminology that will further enable access for the end user. Image and multimedia files are validated, and record structures and links checked before the assembled digital library is transferred to Distributors.

AMICO Distributors

There are many different user communities interested in access to networked cultural heritage. AMICO recognized at least three fundamentally different audiences based on the academic level, sophistication and age of the users, the political jurisdictions and geographical locations of the subscribers, and the language of the interface. Rather than assume that we would be able to create distribution systems that catered to all these diverse needs AMICO has contracted with established network information providers to deliver the AMICO Library to their constituencies. Each distributor integrates the AMICO Library into their systems, and provides access through an interface that meets their clients needs. It is, therefore, possible to gain access to the AMICO Library through a number of distinct service providers: The Research Libraries Group (RLG) offers an academic and research focused application. A state-wide consortium in Ohio (OhioLink) has developed a delivery to higher education and will be experimenting with K-12 delivery in the coming year. The California Digital Library of the University of California is exploring more user-focused interfaces for their multi-campus system. Other distributors are being approached for primary and secondary school users, public library users and users in other countries. This strategy enables distinct communities to encounter the AMICO Library in environments they already know, integrated with other data which adds value for their purposes, and with tools that provide for their needs. Our key goal is to have users encounter the AMICO Library content when and where they are searching for information.

AMICO itself offers a "Thumbnail Catalog" freely on the web at <http://search.amico.org>. Operating as an 'online brochure' this abbreviated version of the AMICO Library, contains only small images (maximum 128 pixels) and a limited selection of

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Figure 2: AMICO Thumbnail Catalog Search Result: "Carolina"

the fields of textual description about the work. It allows prospective subscribers to browse the Library, gives the public an overview of the member museums' collections, and provides a facility to comment on particular works. The Thumbnail catalog also contains work-level links to the Rights and Reproductions office of the each museum, so that those seeking rights beyond those AMICO can offer may easily request them. Figure 2 shows a search result from the Thumbnail Catalog.

The first full application delivering the AMICO Library was developed by the Research Libraries Group (RLG – <http://www.rlg.org>) a not-for-profit membership association of libraries and research institutions. RLG offers bibliographic services, and a series of online resources in the humanities, including abstracting and indexing services, archival resources, and a developing cultural resources service. Integrating the AMICO Library within the RLG environment offered a number of advantages for existing RLG users. First, the interface was familiar: if you could use one of RLG's other files in Eureka, you could use the AMICO Library. The RLG Eureka application provides users with the full data in the AMICO Library, in a number of different views that will seem familiar to users of image databases. Search results are presented in list form, accompanied by a small thumbnail image. A click on any image, opens the full record for that work. Clicking on the image

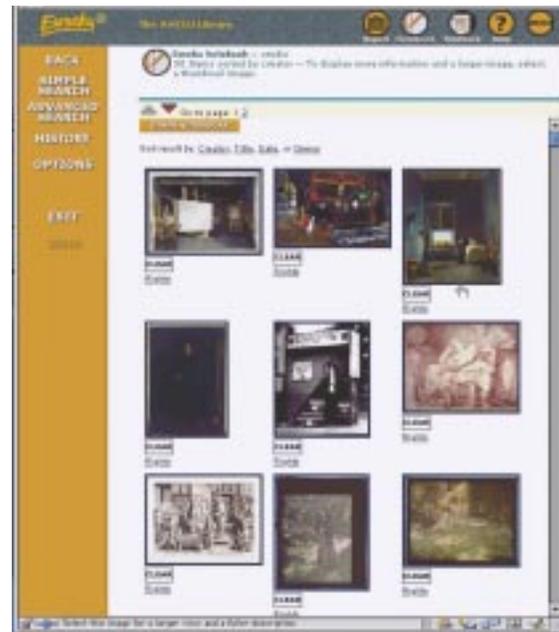


Figure 3: A search result in the AMICO Library, as delivered through RLG's Eureka service

in the catalog record opens the full image (at one of two pre-defined resolutions). Users may also order the TIFF images through RLG to be delivered offline. Figures 3 and 4 show this dialog.

Subscribers



Figure 4: A full catalog record from the AMICO Library, as delivered through RLG's Eureka service

Educational institutions subscribe to the AMICO Library on behalf of their user communities. Universities, colleges, schools, libraries, museums, and galleries are all potential subscribers, and pay an annual license fee for unlimited access to a growing library. Each user community receives access under a license tailored to their needs. (AMICO 1999e) Development of these license agreements has taken several years – terms for them were originally developed in discussions in the Museum Site Licensing Project (MESL) and adapted through experience in the AMICO University Testbed Project – and represents yet another benefit that AMICO has been able to deliver to its members. The license agreement specifies who can use the AMICO Library (such as faculty, staff, students, researchers, walk-in users and distance education students) and what uses they can make of the content (non-commercial educational uses, including presentations, papers, theses, lectures, and integration into in local systems, if they are access controlled). No AMICO license allows publication, web or other redistribution or commercial use of works in the AMICO Library because these rights need to be granted directly by each rights holder AMICO has provided a shortcut approach to obtaining publication rights by including the link to each members Rights and Reproduction Office. We ask that institutions have a policy on access to electronic resources in place, that includes appropriate measures for sanctioning infringing users, in order to balance the decision not to include technological controls on access beyond user authentication.

Selecting Content

Collections development for networked cultural heritage will remain a challenge for some years. The size and scope of the problem – collections comprising millions of works are not uncommon – requires any solution to be incremental. At about 55,000 works there are more gaps in the AMICO Library than there are strong points – more holes than cheese – and opinion differs as to the appropriate strategy for collection development. In theory, a consortium could “pull” content from its members by requesting specific works, but as a voluntary organization that does not fund the activities of its members AMICO treads a fine line when it recommends strategies for collection development. Since AMICO Members contribute content that they digitize themselves, it is most likely that the

majority of the works chosen for each year’s edition will be those that reflect members priorities. This “push” strategy has some unsuspected advantages – content currently being used by the museums not accidentally intersects with the interests of the users: new acquisitions, loans, temporary or loan exhibitions, permanent collection gallery reinstallations, and published works are all those in the public eye. In addition, content being used by the museums in any given year will have the best documentation and the best photography. Push from the repositories is also a more efficient strategy for collections development. Digital documentation (indeed even museum photography) does not already exist for much of a museum collection. Often significant research is required in order to document collections. If other priorities are driving digitization, photography and research, it is most efficient to use the resulting record to build collaboratively constructed resources.

Strategies to construct content by “pulling” what users request or editors suggest, is complicated by the differences in opinions between different users as to what constitutes critical mass or desirable content. In focus group studies conducted by AMICO in 1999, we found tensions between users who want breadth of coverage, and many representative works, and those who want depth of coverage, many images of a particular work along with detailed documentation and accompanying multimedia. We found some potential users wanted works that they were familiar with while others thought it would be more valuable to have obscure works and works from hard to get to collections. In short, the expectations and desires of digital library users will color their perception of networked cultural heritage resources. Collectively they will not seek the same content, for the same purposes. AMICO has accepted that the AMICO Library will grow over time. Vehicles to facilitate communication between users and AMICO Members to identify pockets of broadly useful content may be a way forward.

Defining Documentation

Of course the question about what content to include and how to obtain it does not end with which works should be included. Indeed, choices about content only begin with the identification of which works will be included in the digital resource. The

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more significant choices are what documentation of each work to include. AMICO is not a slide library –its value resides in the textual descriptions and other documentation about the work, not just in an images of it. As the range of multimedia about each work in the library increases (sound files, movies, structured texts) and the depth of each of these files increases, the decisions about content multiply. One important consideration is that the content itself will be regularly updated, for technical reasons as well as because the knowledge available about a given work expands. Content itself must be sustainable and extensible. Ideally it will be sufficiently granular to support a variety of views and sufficiently interoperable to connect to other resources. Some of the goals conflict with others.

The data model developed by any digital library project will be critical to its success. But this is not a simple matter of adopting an appropriate standard, because as of yet the museum community and the digital library metadata community are without standard record architectures. If the data model of the digital compilation requires each institution to re-create its existing documentation, significant costs will be incurred and technical problems encoun-

tered that will be barriers to content acquisition. In some relatively small, focussed, and discipline driven projects – such as the Beowulf project (University of Kentucky <http://www.uky.edu/~kiernan/eBeowulf/guide.htm>) or the Rossetti Archive (University of Virginia <http://jefferson.village.virginia.edu/rossetti/>)– it may be possible for scholarly participants to significantly enhance each item of documentation to make it conform to a new standard. But broader collections will find institutions cannot afford to participate in numerous digital library compilations if each requires different data from what they normally make for themselves and different from that of each other project in which they are involved. The AMICO model has several levels of granularity and few mandatory fields. It does not typically require any new data to be created, but its extensible record architecture creates a relatively rich connection between text, multimedia and computer file documentation

A work in the AMICO library is documented by at least three logically and physically separate parts, diagrammed in Figure 5. The first is the *catalog record* that describes the work of art itself, recording a wide variety of fielded textual information, includ-

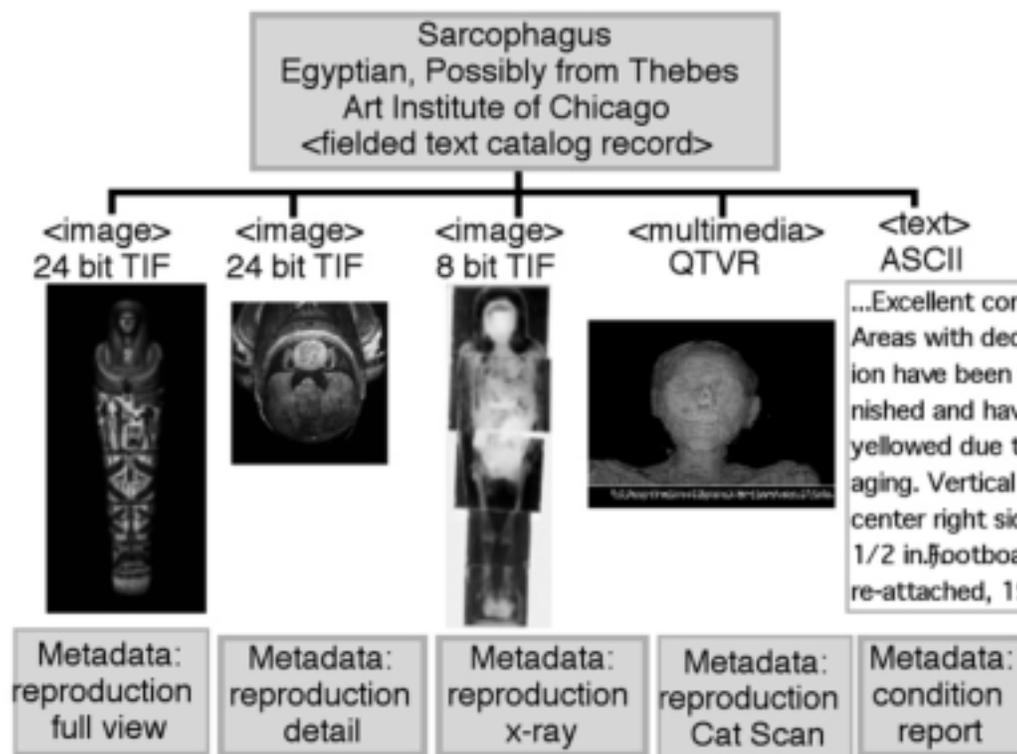


Figure 5: Sample AMICO Library Work from the Art Institute of Chicago

ing its physical description, the circumstances of its creation, information about its creator, past history, provenance, social and artistic context, and providing access points for these details. The AMICO Data Specification (AMICO 1999f) outlines the field structure and format of the catalog record. It was constructed to use data categories defined by the Categories for Description of Works of Art (CDWA, 1995).

Each catalog record must be accompanied by at least one digital image of the work of art, providing critical visual evidence. This image has been defined as a *minimum* of 1024 x 768 pixels in 24-bit color at 72 dpi. The minimum was set based on current display technology and Internet transfer speeds. Members are, however, encouraged to contribute images of much higher quality, and the Library includes files that range in size up to approximately 30 MB. These files come to AMICO as uncompressed TIFF files, and are subsequently sized and sampled for distribution, with the full images available should a user request them.

AMICO Works may also be documented by other associated images, showing details of the work, or views in different lighting conditions (such as x-rays, or raking light views). "Records" may also include linked multimedia files, such as QuickTime videos (with or without sound), sound files from an audio tour including a narration about the work, and extended texts (in SGML, XML, PDF or other format) ranging from condition reports, to catalog entries to articles published about the work. All these linked files may be submitted in any registered MIME type, according to the AMICO Multimedia File Specification.

Each digital object – MIME Type linked to a catalog record – is itself documented by a text metadata record, providing information about its creation, physical and technical dependencies, rights and restrictions and relationships. These multimedia metadata records are essential to managing and interpreting the digital objects both in the compilation of the library and over time, as they provide essential data that is extrinsic to the physical file format itself. The content of Multimedia Metadata records can be found in the AMICO Data Specification (AMICO 1999f).

In the library community, the economics of copy cataloging motivated the adoption of shared stand-

ards for bibliographic records. The artifact-based cultural world is without widely accepted and implemented standards for documenting works of art and artifacts because the uniqueness of the objects of study has, until now, denied any economic benefits in sharing their cataloging. Sharing cataloging of digital surrogates could, in theory, change this and lead to greater acceptance of description standards. But even if standards were universally accepted, cultural objects are not self-describing (they lack title pages and ISBNs created by publishers). Since one can rarely catalog the interesting aspects of most cultural objects simply with information from the artifact itself, any two descriptions of the same item will differ. In addition, descriptions will differ as a reflection of the nature of the repository which holds them and their potential users. A local history collection may hold a mass-produced object, collected and cataloged because it was owned by the town's founder. A work of art may offer little evidence about where and when it was created, and its significance may be where it was installed, or who commissioned it, as much as who painted it. In addition, opinions about cultural artifacts often differ, and descriptive systems need to accommodate both uncertainty and conflict in cultural information if they are to reflect the basic requirements of humanistic discourse.

How digital collections represent knowledge is critical to their utility and authenticity. In the cultural arena, simply adhering to "standards" isn't adequate to ensure good documentation. *How* standards are implemented is crucial. AMICO has developed a number of strategies to implement community-based recommendations such as the *Categories for the Description of Works of Art*. For example, the AMICO Data Specification separates display data from access data. This makes it possible for us to respect the nuance of the curator's prose, while providing predictable indexing of its content. Editorial consistency can be improved through shared authority files and indexing rules, but not all institutions are able to implement recommendations to the same level. So AMICO has developed a set of field-level parsing routines that index textual descriptions of dates (such as circa 1876), and some full text strings (such as artists names). Where possible, we do this in conjunction with existing external reference files, such as the *Art and Architecture Thesaurus* and the *Union List of Artists Names* (ULAN).

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But these files are not comprehensive, so processes must be put in place to extend them with the new data found in AMICO Library contributions. For example, over 30% of the names in the 1999 edition of the AMICO Library were not found in ULAN. Over the coming years there is a need for collaboration among organizations creating networked cultural heritage information to articulate guidelines for the application of existing documentation standards, to develop means for articulating best practices, and to define them when necessary.

There are also issues in documenting complex multimedia objects that are only now being addressed in fora such as the MPEG 7 discussions. As creators of complex information objects we are in serious need of formats that enable us to describe and maintain sophisticated document structures. Until complex document descriptions in a language such as RDF are widely deployable, we will have to be vigilant in the maintenance of the links between our various multi-part digital information objects.

Significantly, the cultural and humanities communities are just beginning to consider the issues involved in cross-resource discovery and information use. It is still very difficult to move across collections, and to link from original materials to other resources such as abstracting and indexing services, or full texts online in resources such as JSTOR. Most often in our digital collections we mimic the physical arrangement of document storage rather than enabling the intellectual re-organization of knowledge construction.

Specifying Technology

The digital library is a hybrid systems environment, where information moves with great rapidity between and among technological and communications systems. Systems integration becomes a great challenge. Within the AMICO framework:

- Members collections data has been created for and resides collections management systems, image capture and management systems, audio systems, video systems for film, videotape and digital delivery, multimedia authoring systems whose content is delivered to in-gallery interpretive environments and to online/web-based systems and editorial/publication production systems.

- AMICO itself has a central contribution management system which validates image, text and multimedia adherence to AMICO specifications, file format verification tools, and member and distributor support systems.
- AMICO's distributors have database management, indexing and retrieval systems, user authentication systems, and information delivery interfaces and tools.
- Subscribers have local on-campus systems, including online public access catalogs, local image and database resources, course web pages, and other teaching and testing tools, and
- Users themselves have a range of analytical, research and study systems.

The information about works in cultural heritage collections delivered over networks must move freely between and among these systems; cultural heritage information is integrated into systems throughout organizations, each of which supports specific functions. Shared and widely, consistently deployed standards are essential to preserve the integrity of information at a technical and a logical level during these transportations and transformations.

Multimedia file formats and structures are the most vulnerable at the moment, and the most challenging, because they remain un-standardized. The verification and maintenance of links within and among complex objects relies in part on consistent and unique resource naming and the establishment of a means of persistent identification. But consistent information capture and description standards are just as critical for the creation of digital cultural heritage information with integrity. Without them, we can't expect comparable results across collections.

Cultural heritage institutions must also address the twin requirements of user authentication and resource authenticity. Authentication is a matter of maintaining systems security, and managing access and use permissions. Authenticity requires the maintenance of trust in the digital environment and in a particular digital representation of knowledge (Bearman & Trant, 1998). Regardless of how secure a system is, if you can't trust, or interpret the information that it contains, its utility is greatly compromised.

Intellectual Property Issues

Consistent intellectual property terms and conditions, that enable a wide range of educational and scholarly purposes, are critical to the creation of viable and useful networked cultural heritage resources. Frameworks are required that provide for the distinct needs of different kinds of communities, and that recognize the varying levels of risk inherent in particular uses.

Many creative works are under copyright, and we need to find ways to ensure that history and scholarship do not stop with the public domain. It is possible to craft agreements that work for copyright holders while respecting the economic realities of education, as AMICO's agreement with ARS has shown. But the way forward is not denying these rights, for that will only result in intransigence on the part of the rights holder. Instead, we must negotiate away from fixed per-work fees that impede the construction of large collections, towards more flexible frameworks that respect the changing realities of digital publishing, and varying kinds of digital uses

There are many ways to protect intellectual property in the networked environment, and we have to be careful that we are not impeding use through protection. For example, some types of 'watermarking' interfere with digital images in such a way as to make them useless for certain kinds of analysis (Bissel et.al., 2000). Closed distribution systems prevent the incorporation of digital content into new creative or analytical environments. A range of social, legal, and technological protections are going to be required to support the variety of users and uses of cultural content in the years to come.

Understanding Users

Digital resources are created for their end-users, but until they have been made and distributed, we can only imagine (and hope) who these users might be. In reports from participants after the University Testbed Project which AMICO conducted in 1998-1999 (AMICO 1999g), AMICO members were delighted to learn that the users of the AMICO Library came from a wide range of academic departments and disciplines. Creative faculty and students integrated cultural content throughout the curriculum. As might have been expected, strong use was



Figure 6: Students at the University of Alberta use the AMICO Library in their Canadian Art History class

made in Art History departments, as images were projected in class, used in student assignments and assigned for in-depth study. Art Studio students also used the Library as a resource, browsing it for works that represented particular concepts and using them as inspiration for their own work. One of our goals in structuring access to the AMICO Library institutionally was to encourage new and unexpected uses by non-traditional users. In a Cultural History course taught by Professor Marc O'Connor at Boston College, works from the AMICO Library provided visual context for text and music, as Dürer's *Large Passion* series of prints was shown along with J.S. Bach's *St. Matthew Passion*, and Martin Luther's *Freedom of a Christian*. (see Figure 8). In Technical studies works from the AMICO Library challenged students in image database courses and in a School of Printing.

One lesson of the Testbed experience of relevance to any networked cultural heritage digital resource is that teachers need help in imagining how to use new resources, and time to adapt their teaching and research methods to new media, in addition to upgraded facilities in classrooms and software tools provided by Academic Computing centers. Changing educational methods does not follow directly and inexorably from publishing digital libraries.

As the preceding description of AMICO Library creation, distribution, and use shows, there are many players in this system. Each of these stakeholders is struggling with similar issues about the content of the Library, its documentation, the technology used to create, distribute and use it, the intellectual property framework, and economics of networked information distribution. These players are also engaged in community building, discovering areas of

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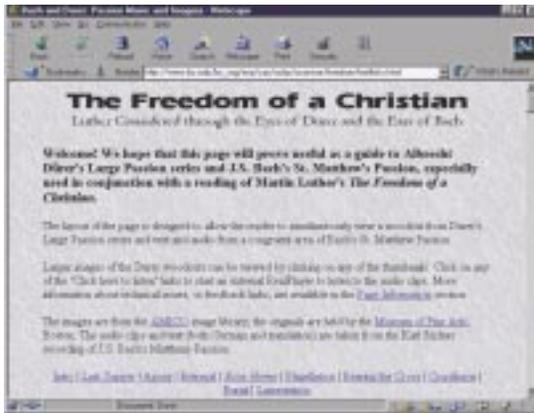


Figure 7: An example of AMICO Library works applied to Cultural History study. Professor Mark O'Connor, Boston College

common interest amongst previously disconnected and different groups.

Sustaining Economics

Creating quality digital cultural heritage is expensive. The richness and complexity of the information that managed in cultural collections adds to the pressure on our already stretched economic systems. Enabling long-term access requires attention to self-supporting economic structures when projects are designed. We must be realistic about funding sources. Often grants get projects started but few sources are available to support on-going operational requirements, AMICO was designed to be a self-supporting not-for-profit, that operates without dependence upon grant funding for its core activities.

There are costs and benefits throughout the information creation and use chain. Our goal was to find a balance, where all institutional participants have a financial stake. Within the AMICO model, no money is returned to members for their participation in the consortium. Members dues and subscription fees support the new costs involved in the collation and distribution of the AMICO Library. Where possible AMICO leverages members' contributions and encourages members, distributors, and subscribers to develop tools to enable use of the Library and to add value to it. (This is allowed by all the AMICO Licenses).

Key in our financial model is the principle that access remains free at the point of use. Pay per view

models act as inhibitors of the widespread use of cultural information that we wanted to enable. Rather, we're looking at the costs, benefits, and investments made by all participants, and trying to create a balanced system, that enables participation by all. As a not-for-profit organization, AMICO has a set of fixed costs that it has to recover for the compilation and distribution of the Library. These do not increase in direct proportion to the overall number of users. Rather, as is the case with much digital information, the first copy costs are substantial, and subsequent users represent a modest cost increment. So the more subscribers there are to the AMICO Library, the lower the cost is to each one.

Conclusions

AMICO's success to date has been based on its ability to craft a successful collaboration built on a shared educational mission and the recognition that what AMICO is trying to do could not be accomplished by any member acting alone. Throughout our planning and first years of operation we've strived to create open and consistent terms for participants. Each member and subscriber signs a common, public, formula-based agreement: there are no special deals. We've used the web to foster open, multi-way communications between and amongst members and subscribers. All AMICO specifications are public, and we've avoided using proprietary technologies.

Collaboration has enabled the members of AMICO to share both the risks and the benefits of groundbreaking work enabling access to museum multimedia. By sharing their past successes (and failures) and making some future decisions in concert, individual members of the consortium can leverage the knowledge of others. Together, all members are raising their level of expertise and awareness.

This climate of collaboration benefits AMICO members, as they have access to a wide range of support on technical, economic, legal, and organizational issues. It enables the activities of AMICO, ensuring that we can create a useful and viable AMICO Library. It enables our distributors to incorporate a new stream of previously unavailable content into their electronic resource offerings. It provides subscribers with unprecedented access to the collections of member museums, and it enables users to

build their knowledge of the objects in our care. Most critically, collaboration in AMICO has ensured that together we can create a strong place for culture in the digital library of the future.

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